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10/598,656

05/16/2007

Christopher J. Kolp

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10/26/2009

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EXAMINER

CHOI, LING SIU

ART UNIT

PAPER NUMBER

1796

MAIL DATE

DELIVERY MODE

10/26/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|------------------------------------|--|
| Office Action Summary | Application No. 10/598,656 | Applicant(s) KOLP ET AL. | |
| | Examiner Ling-Siu Choi | Art Unit 1796 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 22 October 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>09/07/2006</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This Office Action is in response to the Remark filed 10/22/2007. Claims 1-21 are now pending, wherein claims 1-8 are drawn to a composition comprising the reaction product of an isobutylene-diene copolymer and an amine component; claims 9-13 are drawn to a lubricant composition; claims 14-16 are drawn to a process to use the lubricant composition; claim 17 is drawn to a concentrate; and 18-21 are drawn to a process to prepare the composition.

Claim Analysis

2. Summary of Claim 1:

| | |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A composition comprising the reaction product of: | |
| A | an isobutylene-diene copolymer having an M_n of about 1000 to about 150,000 and containing thereon an average of about 0.1 to 4 equivalents, per each 1000 units of M_n of the polymer, of carboxylic acid functionality or reactive equivalent thereof, derived from at least one α , β - unsaturated carboxylic compound; and |
| B | an amine component comprising at least one aromatic amine containing at least one N-H group capable of condensing with said carboxylic acid functionality, selected from the group consisting of 4-phenylazoaniline, 4-aminodiphenylamine, 2-aminobenzimidazole, 3-nitroaniline, 4-(4-nitrophenylazo)aniline, N-(4-amino-5-methoxy-2-methyl-phenyl)-benzamide, |

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| | |
|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | N-(4-amino-2,5-dimethoxy-phenyl)-benzamide, N-(4- amino-2,5-diethoxy- phenyl)-benzamide, N-(4-amino-phenyl)- benzamide, 4-amino-2-hydroxy-benzoic acid phenyl ester, and N, N - dimethylphenylenediamine. |
|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Summary of Claim 18:

| | | |
|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A process for preparing a carboxylic derivative Composition, comprising: | | |
| A | reacting | |
| | i | an isobutylene-diene eopolymer having an M_n of about 1000 to about 150,000 and having on average about 0.1 to about 2 units of reactive carbon-carbon double bonds per each 1000 units of M_n of the polymer, with |
| | ii | an α , β -unsaturated carboxylic compound having carboxylic acid functionality or reactive equivalent thereof; and |
| B | reacting the product of (a) with an amine component comprising at least one aromatic amine containing at least one N-H group capable of condensing with said carboxylic acid functionality, selected from the group consisting of 4-phenylazoaniline, 4-aminodiphenylamine, 2-aminobenzimidazole, 3-nitroaniline, 4-(4-nitrophenylazo)aniline, N-(4-amino-5-methoxy-2-methyl-phenyl)-benzamide, N-(4-amino-2,5-dimethoxy-phenyl)-benzamide, N-(4- amino-2,5-diethoxy- phenyl)-benzamide, N-(4-amino-phenyl)- benzamide, 4-amino-2-hydroxy-benzoic acid phenyl ester, and N, N - dimethylphenylenediamine. | |

Claim Rejections - 35 USC § 103

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3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-8 and 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burrington et al. (WO 01/98387 A2) in view of Mishra et al. (US 5,409,623).

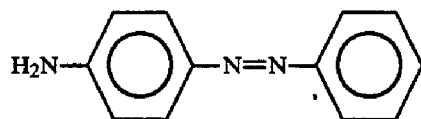
Burrington et al. disclose a carboxylic derivative composition derived from a **carboxylated isobutylene-polyene copolymer** having M_n ranging from about 200 to about 10,000 reacting with at least one of **(a) amines** characterized by the presence within their structure of at least one condensable H-N < group, (b) alcohols, (c) reactive metals or reactive metal compounds, and (d) a combination of **two or more of any of (a)** through (c), the components of (d) having been reacted with the carboxylated isobutylene-polyene copolymer simultaneously or sequentially, in any order, wherein the copolymer has thereon from about 0.8 to about 7 moles per mole of copolymer of groups derived from at least one α , β -unsaturated carboxylic acid or reactive equivalent thereof and wherein the polyene is a diene comprising at least one of isoprene, piperylene and 1,3-butadiene; the α , β - unsaturated carboxylic acid or reactive equivalent thereof comprises at least one member of the group consisting of acrylic compounds, maleic compounds, fumaric compounds and itaconic compounds (claims 1, 10, 12, and 15).

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Burrington et al. further disclose that the use of such carboxylic derivative composition leads to increasing the viscosity index of lubricating oil composition.

The difference between the present claims and the disclosure of Burrington et al. is the requirement of the specific amine to be used.

Mishra et al. disclose a composition comprising **a modified graft copolymer** obtained by **grafting an ethylene alpha-monoolefin copolymer** comprising about 15 to about 80 mole % ethylene, about 20 to about 85 mole % of at least one C₃₋₁₀ α -monoolefin and 0 to about 15 mole % of a polyene selected from non-conjugated dienes and trienes and having an average molecular weight ranging from about 5,000 to about 500,000 **with at least one ethylenically unsaturated carboxylic acid material**, followed by being **modified with an amino aromatic compound**; wherein the ethylenically unsaturated carboxylic acid material is maleic anhydride or itaconic anhydride and the aromatic amino compound can be 4-phenylazoaniline:

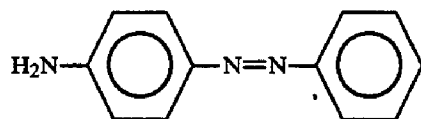


(col. 4, line 51; claims 1 and 5-6). Mishra et al. further disclose that the use of such modified graft copolymer results in viscosity index improvement, dispersancy, and anti-oxidant properties to the oil in the formulation of the lubricating oil composition [motivation] (claim 1). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use 4-phenylazoaniline in the composition disclosed by Burrington et al., thereby obtaining the present invention.

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5. Claims 9-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mishra et al. (US 5,409,623) in view of Burrington et al. (WO 01/98387 A2).

Mishra et al. disclose a lubricating oil composition comprising a major amount of an oil of lubricating viscosity and an amount of about 0.1 to about 3.0 wt % of a **modified graft copolymer** based on the total weight of the oil composition, comprising an **ethylene alpha-monoolefin copolymer** comprising about 15 to about 80 mole % ethylene, about 20 to about 85 mole % of at least one C₃₋₁₀ α-monoolefin and 0 to about 15 mole % of a polyene selected from non-conjugated dienes and trienes and having an average molecular weight ranging from about 5,000 to about 500,000; which is grafted with at least one ethylenically unsaturated carboxylic acid material; and then **modified with an amino aromatic compound**; wherein the ethylenically unsaturated carboxylic acid material is maleic anhydride or itaconic anhydride and wherein the aromatic amino compound can be 4-phenylazoaniline:



(col. 4, line 51; claims 1 and 5-6). Mishra et al. further disclose that the use of such modified graft copolymer results in viscosity index improvement, dispersancy, and anti-oxidant properties to the oil in the formulation of the lubricating oil composition [motivation] (claim 1).

The difference between the present claims and the disclosure of Mishra et al. is the requirement of the isobutylene-diene copolymer to be used.

Burrington et al. disclose a lubricating oil composition derived from a **carboxylated isobutylene-polyene copolymer** having M_n ranging from about 200 to about 10,000 reacting with at least one of (a) **amines** characterized by the presence within their structure of at least one condensable H-N < group, (b) alcohols, (c) reactive metals or reactive metal compounds, and (d) a combination of two or more of any of (a) through (c), the components of (d) having been reacted with the carboxylated isobutylene-polyene copolymer simultaneously or sequentially, in any order, wherein the copolymer has thereon from about 0.8 to about 7 moles per mole of copolymer of groups derived from at least one α , β -unsaturated carboxylic acid or reactive equivalent thereof (claims 1). Burrington et al. further disclose that "A suprising benefits is that the derivatives of this invention provide superior viscometrics when used in lubricants compared to the viscometrics observed when corresponding derivatives derived from high vinylidene polyisobutylenes are employed" (page 3, lines 27-30). In light of such benefit, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the isobutylene-diene copolymer in the composition disclosed by Burrington et al., thereby obtaining the present invention.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ling-Siu Choi whose telephone number is 571-272-1098. The examiner can normally be reached on Monday to Friday.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu can be reached on 571-272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

/Ling-Siu Choi/

Primary Examiner, Art Unit 1796

October 25, 2009